GLAST activities in France

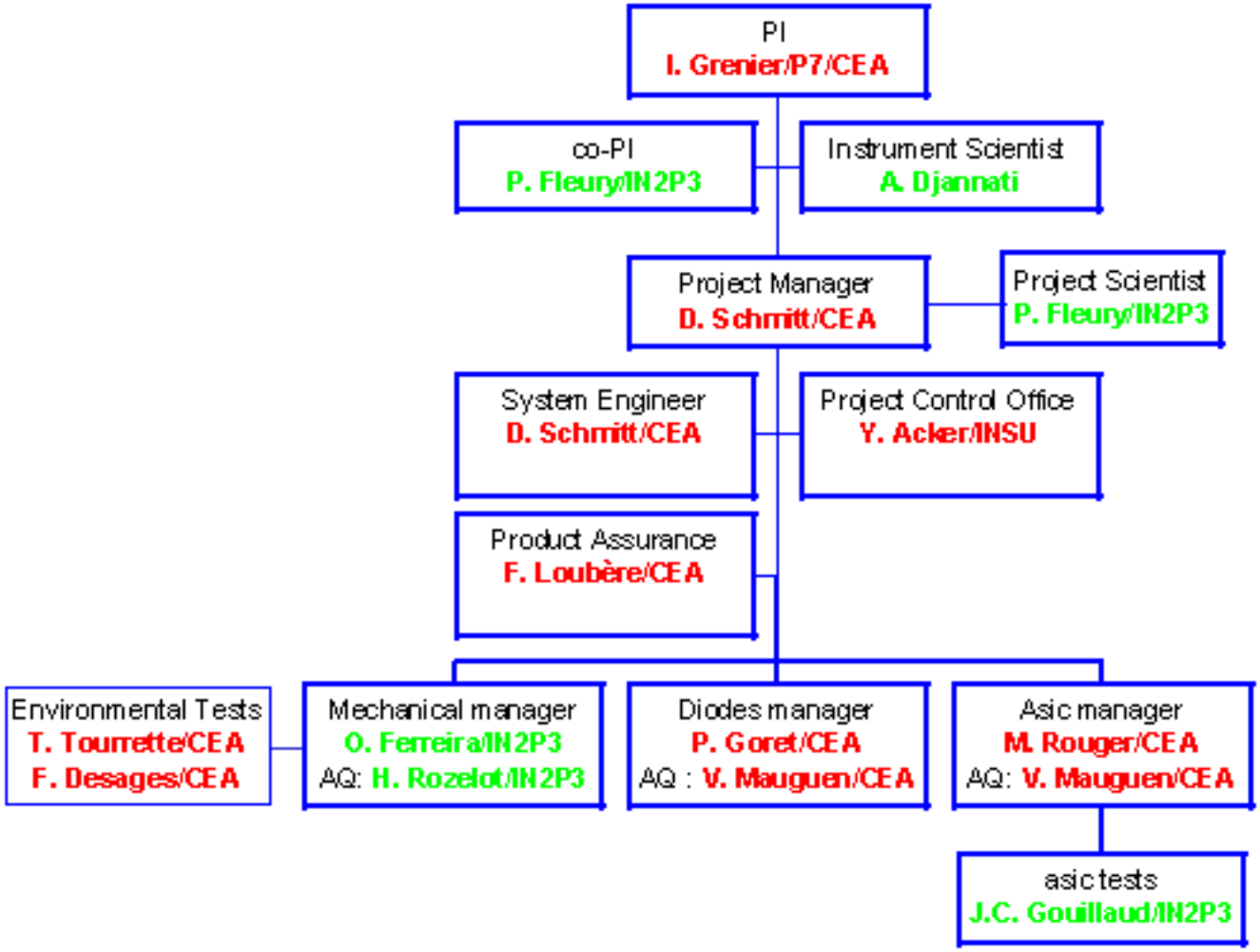
- Collaboration status and Team organization
- C-cell CAL design & qualification
  - mechanical structure
  - light yield
  - diode characterization
  - gluing or not gluing
- ASIC development
- Software activities

French collaboration

- **Interagency agreement**
  - CNES, CEA, and IN2P3 formal support — **Nov. '99**
  - ⇒ interagency agreement is in preparation — **April '00**
- **International agreement**
  - international agreement (LOA) in preparation, — **May '00**
  - commitment: deliver the CAL mech. structure, pre-electronics mechanical assembly, AFEE asic

    ≈22.6 M€ (A-D) + 10.2 M€ (E)
  - science commitments: software (instr+science), source catalogue, science data center mirror site
- **organization chart**

FRENCH ORGANIZATION CHART



CAL MECHANICAL STRUCTURE

- **ENGINEERING MODEL 1** **(nov '99)**
  - low level sine wave 5-2000 Hz @ 0.25g along 3 axes (beginning & end)
  - random vib. 20-2000 Hz (std) along 3 axes
    - tightening system safe, same signature before & after random vib.
    - no degradation of the CsI surface
    - ν(CsI long. mode) ~ 400 Hz
- **ENGINEERING MODEL 2** **(summer '00)**
  - 8 x 12 cells (glued), AO dimensions, CsI + dummies, optical walls
  - pressure caps for optical silicon pads

    $\Rightarrow$ vibration tests
- **ENGINEERING MODEL 3** **(autumn '00 -- PDR)**
  - 8 x 12 cells (block), final dimensions, CsI, final optical walls and caps

    $\Rightarrow$ qualification tests

Vibration test

- Check Xal tightening system: rubber bands at log edges
- Check if Xal surface not damaged inside the cell

Test set-up

- 1 Crismatec polished Xtal 30x23x370 mm^3 with home made ~1mm chamfers
- 2 dummies with same density (aluminum and steel)
- 3 cells composite structure closed with aluminum caps and a 1 mm thick silicon spacer (0.4mm walls)
- 4 rubber cords ϕ1mm
- Clearance between crystal and walls 0.2 to 0.4mm

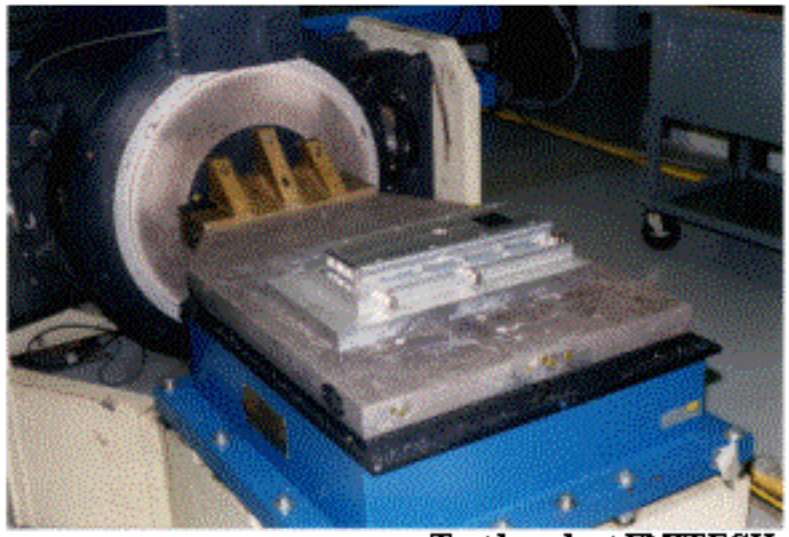
Vibration test levels

Low level sine vibrations 3 axis: 5 to 2000Hz at 0.25g

Random vibrations 3 axis:

20Hz		0.026g^2/Hz
20 to 50Hz		+6dB/oct
50 - 800Hz		0.16g^2/Hz
800 - 2000Hz		-6dB/oct
2000Hz		0.026g^2/Hz

Low level sine vibrations 3 axis: 5 to 2000Hz at 0.25g



Test bench at EMITECH

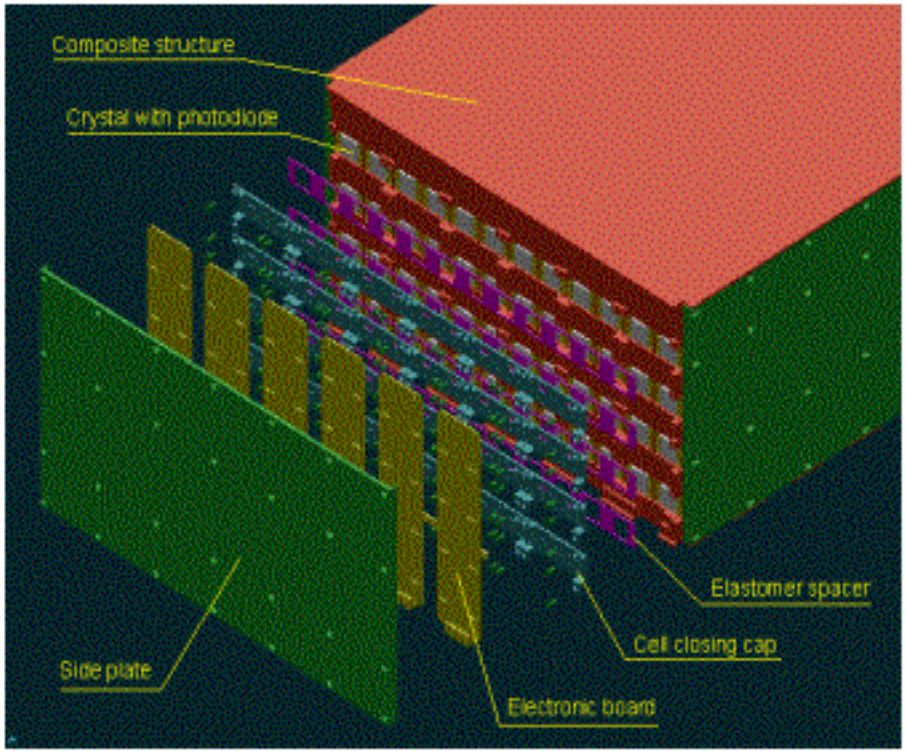
Test results

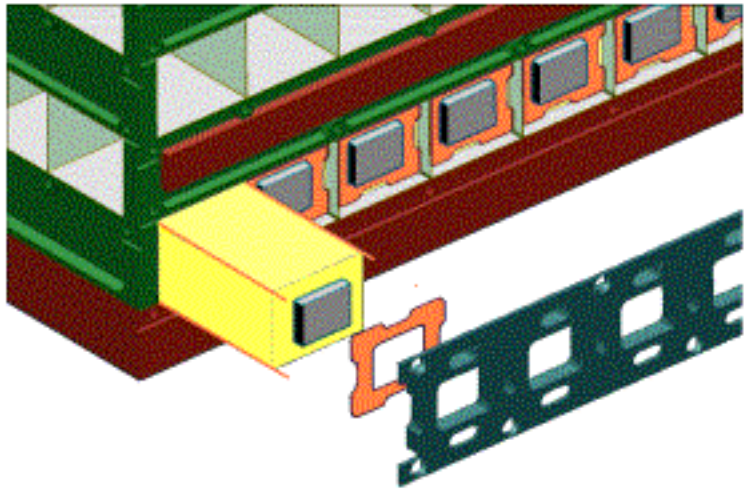
- Lower natural frequency measured 400Hz transverse to structure
- No visible degradation of the crystal surface
- No evolution of the system after random vibrations

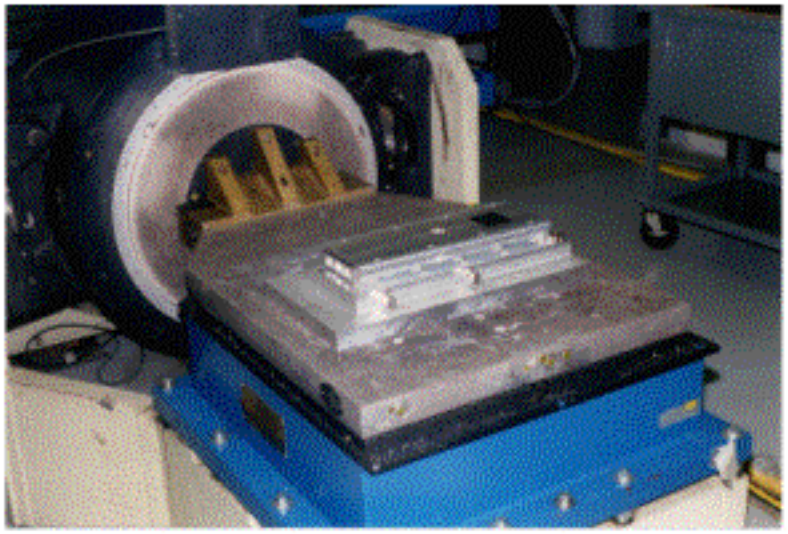
Xal optical properties not measured prior to test (optical test bench not yet ready) but still the best light yield of all logs at Ecole Polytechnique.

New test foreseen with final optical reflector

CAL mechanical structure





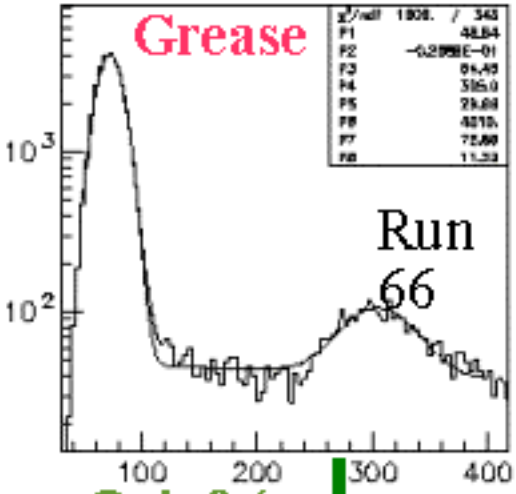


Light yield studies

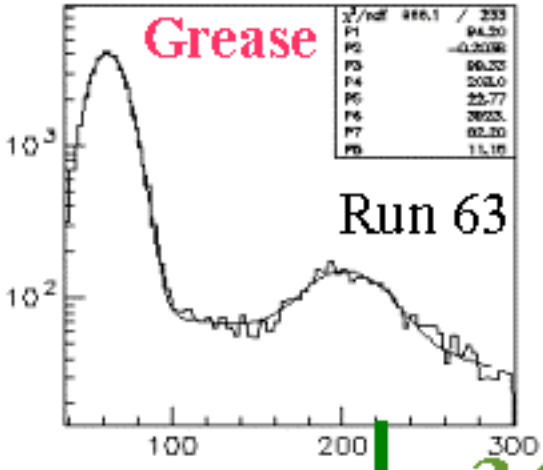
- **test stations operational**
  - with μ, sources, positioning accuracy of 1 cm (CEA), 1 mm (X)
  - 3 Xals or cells, diodes, calibrated readout electronics
  - controlled pressure tests for optical pads in near future
  - MONICA: diffusivity/reflectivity measurements of lining
- **lightyield vs. lining in C-cell**
  - final estimates **May '00**
- **lightyield vs. vibrations**
  - 1 cell with CsI and opt. walls, vib. tests **June '00**
- **lightyield reproducibility**
  - eng. model 2, with <10 CsI Xals, vib. tests **summer '00**
- **optical joint** **ongoing**
  - testing various silicon pads, lightyield vs. cap pressure, cap closure
  - || gluing solutions

Light yield studies

Thick Tyvek +alu+ white ends



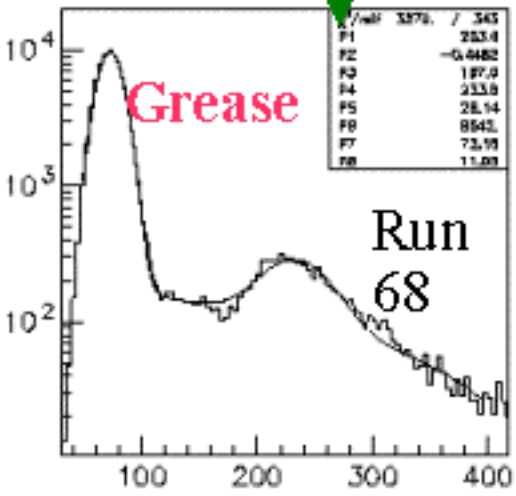
- 40 %



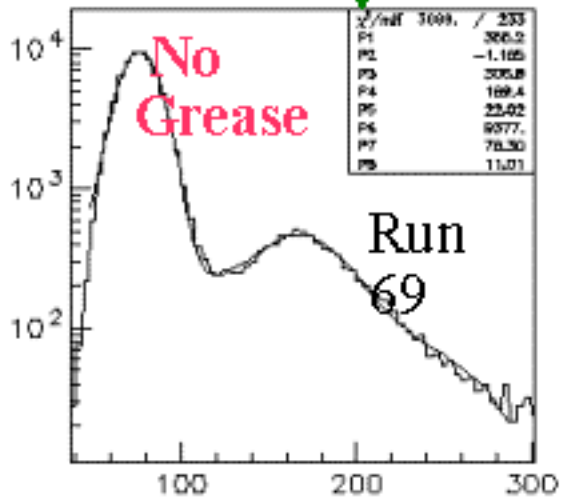
- 34 %

Al. Mylar + white ends

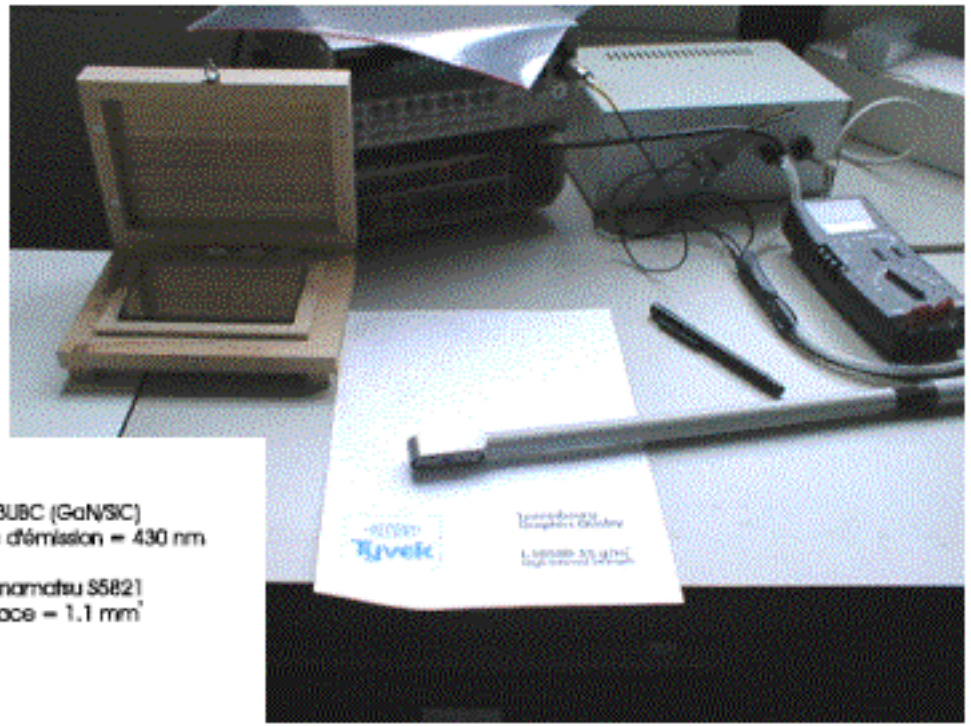
- 34 %

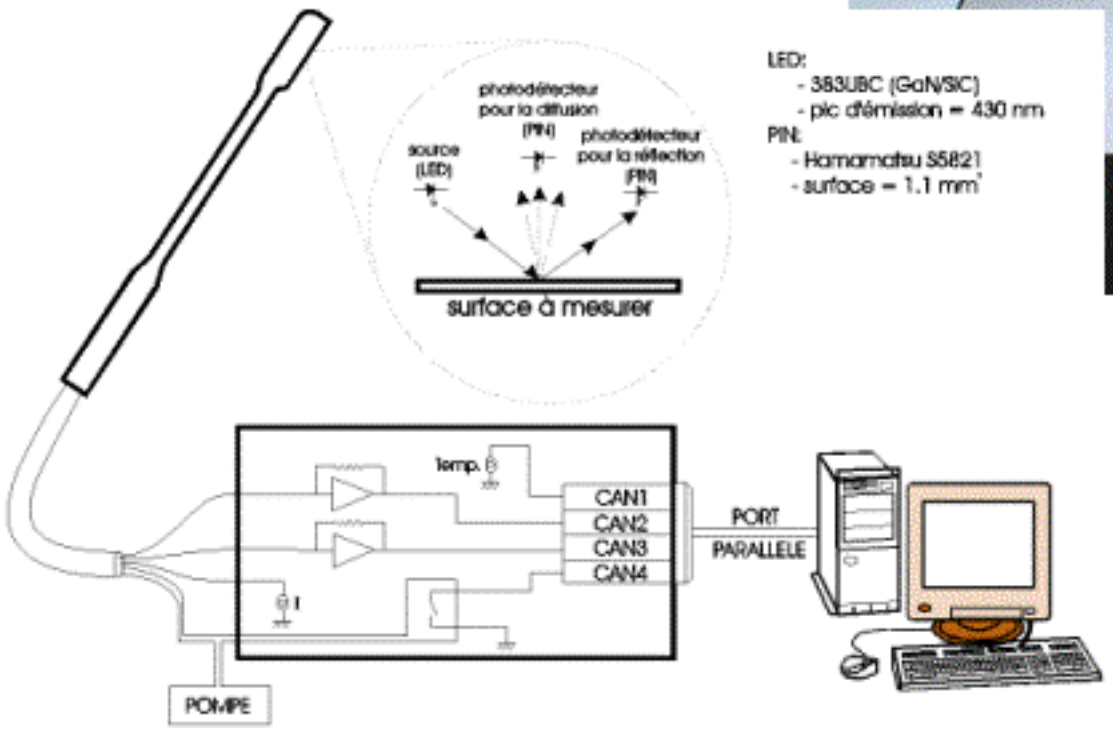


- 39 %



MONICA





LED:
- 383UBC (GaN/SiC)
- pic d'émission = 430 nm

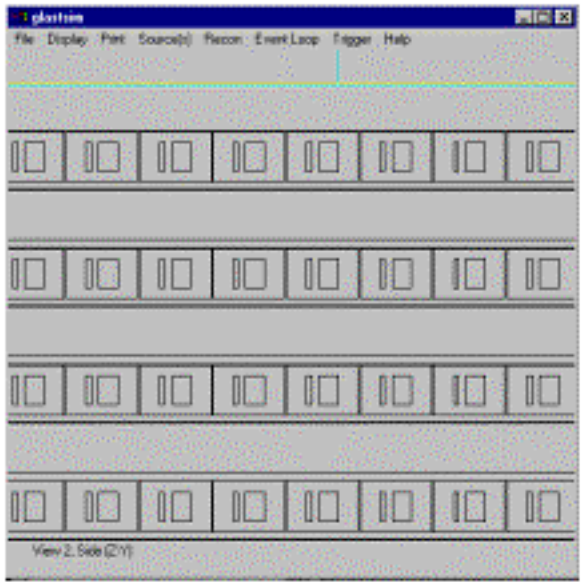
PIN:
- Hamamatsu S5821
- surface = 1.1 mm²

Asic development

- meeting CAL electrical architecture — **Feb. '00**
- specs — ready ≤ June '00 ⇒ architecture review in — **Aug. '00**
  - optimization of energy bands
- asic design review — **Dec. '00**
- development schedule
  - start in June '00
  - too tight schedule: run #1 in Feb. '01, run #2 in Sept. '01
    ⇒ 5 more months (submission dates, more testing)
  - characterized chips and corrections for the « flight » run ready for CDR
  - BUT run #2 chips to be delivered for BTEM March 1st '02
    ⇒ 3 or 4 months late for BTEM delivery

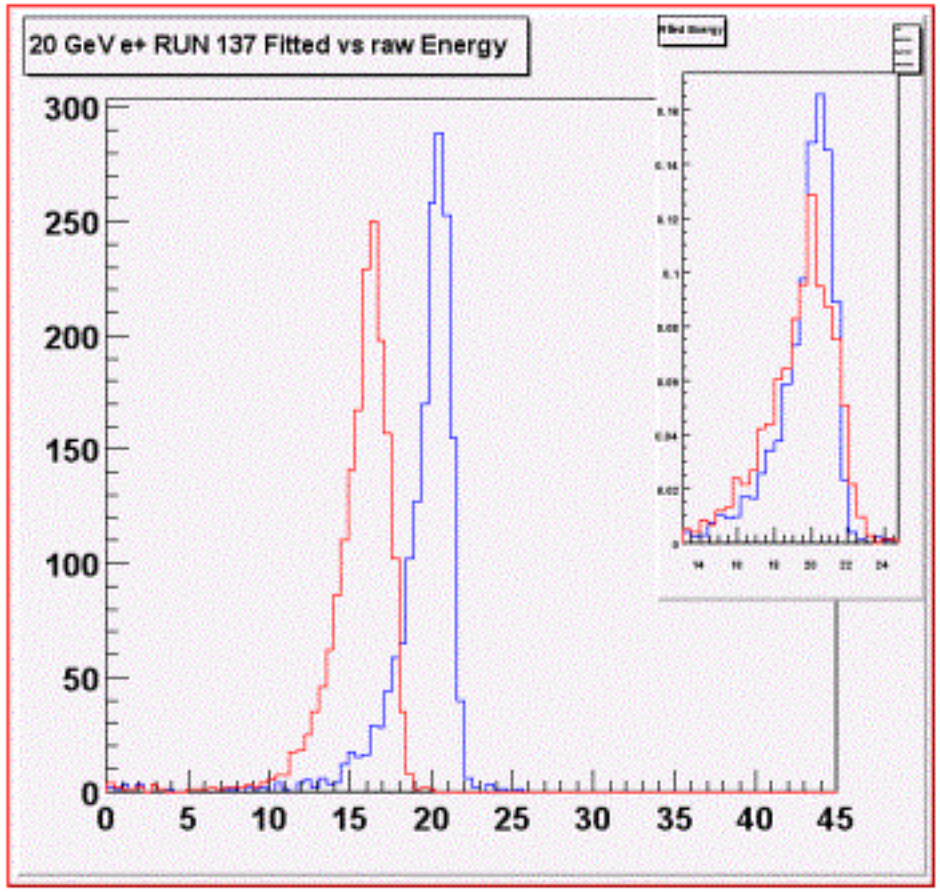
Software

- simulation activities: optimization of CAL design
  - more realistic CAL description
    - energy deposition in diodes
    - noise
    - asymetry…
    - Xal to Xal energy gain dispersion for calibration studies
  - readout threshold 2-5 MeV



Software

- **Energy reconstruction algorithms**
  - profile fitting ok,
  - low energy, cracks, …
- **lightyield optical simulations**
  - light propagation in CsI, air gap, optical walls, opt. joint
  - running
- **near future**
  - TKR/CAL feedback



summer '00